

# **The impact of adult mortality on primary school enrolment in Northwestern Tanzania**

Martha Ainsworth

*Development Research Group, World Bank, Washington, DC*

Kathleen Beegle

*Rand Corporation, Santa Monica, CA*

and

Godlike Koda

*University of Dar es Salaam, Dar es Salaam, Tanzania*

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## Foreword

From a development perspective, education is key. The HIV/AIDS epidemic in sub-Saharan Africa makes scarce resources even scarcer for families trying to cope with an adult death. One common coping strategy in households is taking children out of school because their help is needed at home or because the family can no longer afford school fees. However, withdrawing children from school and thereby depriving them of the essential survival kit of education is not only a threat to their individual future welfare but it also influences the development of the community at large. To gain further information about this important issue, UNAIDS requested that the dataset from the Kagera study (World Bank) be examined from this perspective. This background paper is the result of that enquiry, and it provides important information on the impact of HIV/AIDS on primary schooling.

The objective of the paper is to measure the impact of adult deaths and orphan status on household decisions to enrol children in primary school. The results show that the effect on schooling (at least in Tanzania) is not so much on the enrolment per se, but on when the enrolment takes place. In this area, as in many others, poor households struggle more than the less poor. Another common concern related to children's schooling is what happens when grandparents take over the care of the children. In the case of Tanzania, the effect seems to be minimal for primary schooling.

Such findings have implications for policies. As the paper suggests, programmes linked to the impact of adult mortality must be sure to target children in the poorest families. In the case of Tanzania, which has relatively poor access to, and low quality of, primary schools, another strategy could be to improve the quality of learning instead. Households are very aware that schooling is the key to their children's future. If the schools were made more attractive, the priorities in the families might change and fewer would choose not to defer enrolment of their children in periods of economic crisis.

*UNAIDS, December 2000*

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### **I. Introduction**

The AIDS epidemic is leaving many African children parentless and threatens to reverse hard-won gains in raising school enrolments. Because, in Africa, HIV is transmitted primarily through heterosexual contact, the epidemic is having a dramatic impact on the mortality of both men and women in their prime childbearing and earning years, doubling or tripling mortality rates of adults aged 15-50 (Boerma et al. 1998)<sup>1</sup>. The combination of high mortality of parents and large family size on most of the continent has produced a tragic result: one in ten children under the age of 15 is an orphan, having lost one or both parents (Hunter and Williamson 2000)<sup>2</sup>. The loss of a parent could potentially reduce a child's chances of starting, continuing or completing school: families may be unable to pay school fees; the demand for a child's time at home may increase; and guardians may be less motivated to invest in the child's long-term welfare. Child schooling has important private and social benefits, affecting a child's long-term productivity, earning capacity, health and well-being (see, for example, Psacharopoulos and Woodhall 1985 and Strauss and Thomas 1995).

The impact of the AIDS epidemic on school enrolment in Africa is often superimposed on countries with already low enrolments and low incomes. The average gross primary enrolment ratio (GPER)—the number of children enrolled as a percentage of the total number of children of school age—was only 77% for sub-Saharan Africa in 1996<sup>3</sup>. Moreover, the performance of African countries in raising enrolment rates has varied greatly. Figure 1 presents the change in gross primary enrolment ratios between 1980 and 1997 for six eastern and southern African countries with 1998 per capita incomes ranging from \$210 in Malawi to \$620 in Zimbabwe. Despite low incomes, some of these countries have seen marked improvements in enrolment ratios. Both Malawi and Zimbabwe, for example, raised their GPER to over 100%. On the other hand, the GPER has been stagnant in Zambia and declined in both Kenya and Tanzania. The drop in Tanzania has been particularly large; it now has the lowest GPER—67%—of any of these countries. All of these countries are hard-hit by the AIDS epidemic, with infection levels ranging from 8% of adults in Tanzania and Uganda to 25% of adults in Zimbabwe. While AIDS may have contributed to declines in enrolment rates within these countries, when we look across

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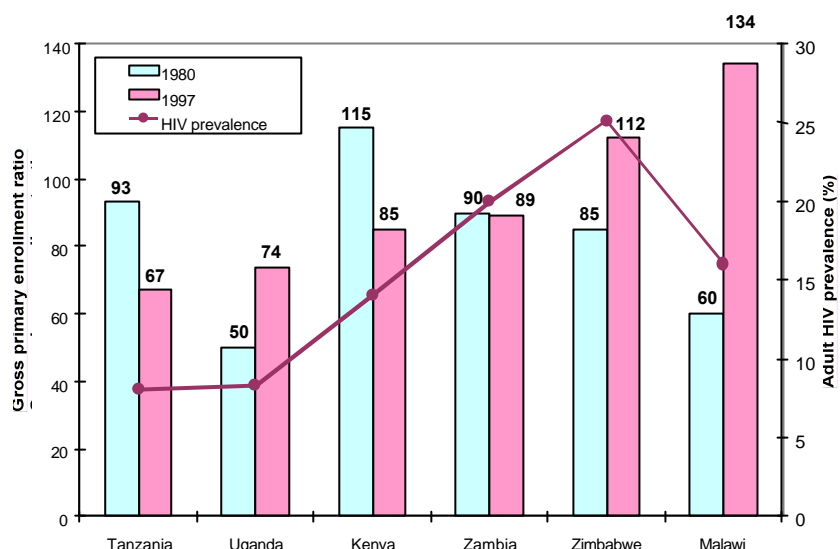
<sup>1</sup> In sub-Saharan Africa, 55% of adult HIV infections are among women (UNAIDS 2000).

<sup>2</sup> In some cases, war has also elevated the adult mortality rate and created many orphans.

<sup>3</sup> The gross primary enrolment ratio is defined as the ratio between the number of children enrolled in primary school as a percentage of all children of primary school age. It can exceed 100% because many children enrolled in primary school are older

countries, it does not appear to be the driving force: with the exception of Malawi, the countries with higher HIV prevalence have *higher* 1997 enrolment rates. Most of the differences in enrolment ratios are no doubt due to differences in income and public spending: Zambia and Uganda spend less than 3% of GNP on education, while Zimbabwe spends more than 8%.

**Figure 1: Gross primary enrolment ratios, 1980 and 1997, and HIV prevalence rates, selected African countries**



Source: World Bank (2000) and UNAIDS (2000).

The international community has become increasingly concerned about the impact of AIDS on African children and now seems willing to fund programmes to mitigate the impact of adult AIDS mortality, including the impact on children's schooling (Copson 2000). Many programmes have been launched or proposed to support the school fees, uniforms and other inputs of orphaned children (Hunter and Williamson 2000, Reid 1993). However, the evidence on the schooling impact of adult mortality in these countries is largely anecdotal, sometimes simply speculative (Gachuhi 1999), and often based on non-representative samples and case studies of severely affected children, with no control group (Kitonsa et al. 2000). That such adverse impacts occur cannot be disputed. However, from the perspective of public policy, it is important to understand how typical these outcomes are, which children are most affected, and which policy instruments are likely to have the greatest impact in raising enrolments. The objective of this study is to measure the impact of adult deaths and orphan status on household decisions to enrol children in primary school. We also identify the characteristics of children with the lowest school attendance and the policy variables that will raise enrolments. We focus on the enrolment of children aged

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than they should be for that grade, due to delayed enrolment and repetition. The net enrolment ratio is the ratio of the number of children enrolled *and of primary school age* as a percentage of all children of primary school age.

7-14, using data from a longitudinal household survey conducted in 1991-1994 in Northwestern Tanzania . We find that Tanzanian households are coping with adult deaths by delaying enrolment of young children (7-10), while maintaining enrolment of older children (11-14). Among orphans, only young maternal orphans are being held back but they eventually do enrol at the same rates as other children. The impact of a recent adult death on delayed enrolment depends on the economic status of the household: children in households of low economic status have delayed enrolment following an adult death, while enrolment of children in better-off households is not affected.

The paper is organized as follows. Section II provides an overview of the factors affecting school enrolments and the channels through which adult deaths can have an impact. In section III, we describe the setting and the dataset. Section IV presents descriptive and multivariate regression results on the determinants of school enrolments. The final section summarizes the findings and discusses the implications for policy.

## **II. Factors affecting the demand for schooling**

Schooling can be thought of as both an investment and a consumption good. It represents an investment by parents in the future productivity and earnings of children, which affects the well-being of parents and their children in the long run. To the extent that parents also get utility directly from the satisfaction of having ‘educated’ children, it can also be thought of as a consumption good. The factors affecting parents’ decisions to enrol their children will include measures of the costs and benefits of schooling both now and in the future, as well as measures of the household’s budget constraint. Specifically, these include:<sup>4</sup>

- The intrinsic value that parents place on an ‘education’.
- The expected long-run benefits of schooling, in terms of increased earning capacity and employment opportunities.
- The quality of schooling available, which affects the economic ‘returns’ that can be expected for an additional year of instruction.
- The household’s current income and its ability to borrow for school expenses against future earnings.
- The parents’ or guardians’ assessment of the child’s innate ability.
- The value of the child’s time now in productive activities inside and outside the home (his/her ‘opportunity cost’ of schooling).

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<sup>4</sup> In most countries, enrolment up to a certain level of schooling is mandated by law. However, in countries like Tanzania that do not have sufficient resources to provide an adequate school infrastructure, these legal constraints can be considered non-binding.

- The other costs of schooling, including school fees, uniforms, the costs of other schooling inputs and the availability of schools.

The higher the intrinsic value of schooling to parents, the expected long-run benefits of schooling, the quality of schooling, household income or ability to borrow, and the child's innate ability, the higher will be the enrolment rate. On the other hand, higher schooling costs and a high value on the child's time now are likely to reduce school enrolment.

Adult deaths will affect school enrolments through this same set of variables. For example, when an adult dies, household income may be lower and the remaining members may not be able to afford to pay for school fees, uniforms, or textbooks—even if they think that schooling would be a good investment. When an adult contracts a fatal illness, the opportunity cost of the child's time may also increase: the child may be needed to care for the patient or to substitute for the patient in different economic activities. As a result, the child may spend fewer hours at school or drop out altogether. Young children may never be enrolled or their enrolment could be delayed. In a broader sense, high adult mortality due to AIDS may indirectly affect the schooling calculations of households without deaths—both by altering the scarcity of different types of labour (raising the wages to jobs in which there is insufficient manpower) and by affecting the parents' calculations on the survival probability of their children into prime-aged adulthood. If parents believe that their children are unlikely to survive into early adulthood, they might make fewer investments in child schooling.

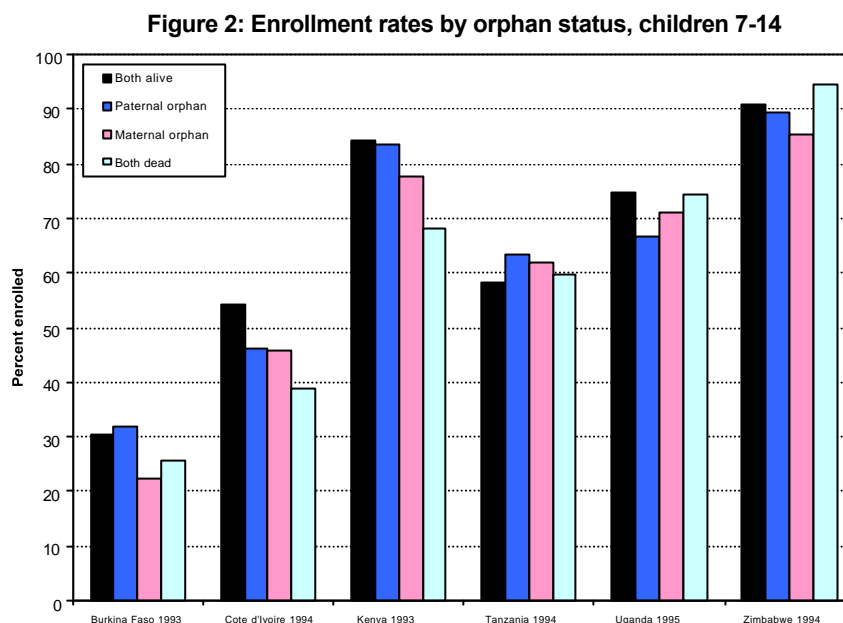
Figure 2 presents enrolment rates for children aged 7-14 by orphan status, drawing on data from the Demographic and Health Surveys (DHS) for six African countries. The extent to which one- or two-parent orphans are under-enrolled relative to children with living parents depends on the country. Two-parent orphans are substantially under-enrolled in Burkina Faso, Côte d'Ivoire, and Kenya<sup>5</sup>. A striking fact about Figure 2 is that the differentials in enrolment among orphans are swamped by the overall pervasive under-enrolment (especially in the Francophone countries), even for children with living parents. This under-enrolment is even more shocking at the secondary level (not shown).

There are few studies that have measured the impact of orphan status on enrolment and examined simultaneously the impact of other important determinants. Lloyd and Blanc (1995) use a multiple regression model that controls for living standards to predict the enrolment rates of children aged 10-14 in seven African countries (Cameroon, Kenya, Malawi, Namibia, Niger, Tanzania, and Zambia). They were

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<sup>5</sup> The differentials in enrolment between orphans and non-orphans may also be affected by the presence of local public or private programmes already targeting orphaned children for schooling subsidies. Note also that even in a large national sample, the number of two-parent orphans is very small. In the 1991-92 national Tanzania DHS, for example, among the 10 027 children aged 7-14, only 69 were two-parent orphans.

unable to find a statistically significant impact of being a maternal orphan or a paternal orphan on school enrolments in Tanzania, which had a lower enrolment rate than all of the other countries except Niger.



Source: DHS.

However, in Kenya there was a statistically significant but relatively small difference in enrolment between paternal orphans (89%) and children with living fathers (93%). In Malawi, the differences were statistically significant and large, with maternal orphans having a 20% lower enrolment rate than children with living mothers (47% vs. 67%) and paternal orphans with a 7% lower rate than children with living fathers (60% vs. 67%). Kitonsa et al. (2000) study a sample of orphans in Entebbe, Uganda (with no control group of children with living parents) and find that their enrolment rate (88%), was *higher* than the national average, which they credit to the traditional extended family, the government universal primary enrolment plan and, possibly, nongovernmental organizations (NGOs) operating in the area<sup>6</sup>. In a study in three districts of Western Kenya, Conroy et al. (2000) found lower enrolment rates among orphans than non-orphans and, among orphans, lower rates among AIDS orphans<sup>7</sup>.

<sup>6</sup> The area was also semi-urban, which could account for higher-than-average enrolment rates.

<sup>7</sup> The differentials in enrolment were quite large in this study, but no information is available on the way in which the sample was selected. Of the 2847 children in the study, 43% were AIDS orphans, 18% were orphans due to other causes, and 40% were non-orphans; the extent to which children in each category might be representative of the larger population of children is not known. However, over half of the AIDS orphans in the sample were two-parent orphans, which is a much higher rate than that found in the general population of orphans. Thus, it is difficult to generalize the results of this study.

### III. The setting and the data

Tanzania is a low-income East African country (1998 GNP/capita of \$220) where, in the early 1990s, 51% of the population was living below the poverty line. The *net* primary enrolment ratio (NPER) (taking into account only children who are of primary school age) was only 48% in 1997—among the lowest in Africa, having declined from 68% in 1980. Current enrolment ratios for both primary and secondary education in Tanzania are below the average for Africa. They rank among the lowest levels of secondary education enrolment in the world.

The Tanzanian education system consists of a seven-year primary school cycle, followed by four years of lower secondary and two years of upper secondary school<sup>8</sup>. Virtually all primary schools are government-run and primary schooling is compulsory. Children are expected to start at the age of seven, but in fact 84% of children start later: the average age at first enrollment for girls is about nine years of age and for boys is nearly ten. There are both supply- and demand-side explanations for late enrolment: on the one hand, because of overcrowding, school authorities often admit first the oldest children who have not yet enrolled. On the other hand, parents often keep their younger children out of school to help with household tasks. Focus group studies have suggested that parents prefer to enrol their daughters earlier so that they will complete primary school before reaching puberty, while enrolment of their sons is delayed so that they will be of working age when they complete primary school. Poorer children are more likely to have delayed enrolment (Mason and Khandker 1997).

There's a national diagnostic examination at the end of standard 4, mid-way through primary school, to determine whether the child is ready to advance to standard 5. About 80% of the children are allowed to continue, 15% repeat standard 4, and 5% drop out. Because of the late starts and repetition, children may be quite old when they complete primary school: in 1992, 16% of children enrolled in standard 7 were 17 years of age or older. Dropout rates are also high: of the cohort entering standard 1 in 1984, 42% dropped out before reaching standard 7. Access to secondary schools is restricted, and admission is governed by the results of an examination. On average, 5-7% of children who complete standard 7 are selected for admission to a government secondary school. Secondary enrolment rates, therefore, are extremely low—a *gross* secondary enrolment ratio of only 6% in 1997. Only recently was the private sector encouraged to expand provision of secondary schools. The quality of schooling and education infrastructure has been deteriorating rapidly (Omari and Mosha, 1997; Roy-Campbell, 1992; TADREG, 1993). Increasingly, there is evidence that parents are reluctant to send their children to school, given the low expected returns coupled with the cost of schooling and the opportunity cost of children's time (TADREG, 1993). Using data from the 1990/91 Labour Force Survey, Mason and Khandker (1997)

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<sup>8</sup> The material in this section is drawn from an excellent review of the education sector by the World Bank (1999b).



estimated that the average return per year of primary school was only 7.9% in Tanzania, which they assert is low compared to other developing countries.

A previous study of the determinants of enrolment using the nationally-representative Tanzania Human Resources Development Survey (THRDS) found that enrolment in 1993-94 was not strongly influenced by the monetary costs of schooling (Mason and Khandker 1997). The Universal Primary Enrollment (UPE) fee charged at the time of the first wave of the survey in 1991-92 was 200 Tanzania shillings (Tsh), or about 91 cents (US)<sup>9</sup>. This fee is retained by the schools and used to finance an annual school plan approved by the school committee (E. Malangalila, personal communication)<sup>10</sup>. The 1993-94 THRDS found that uniforms were 48% of primary school costs, followed by contributions and fees (20%) and supplies (20%) (World Bank 1999b).

### *The setting*

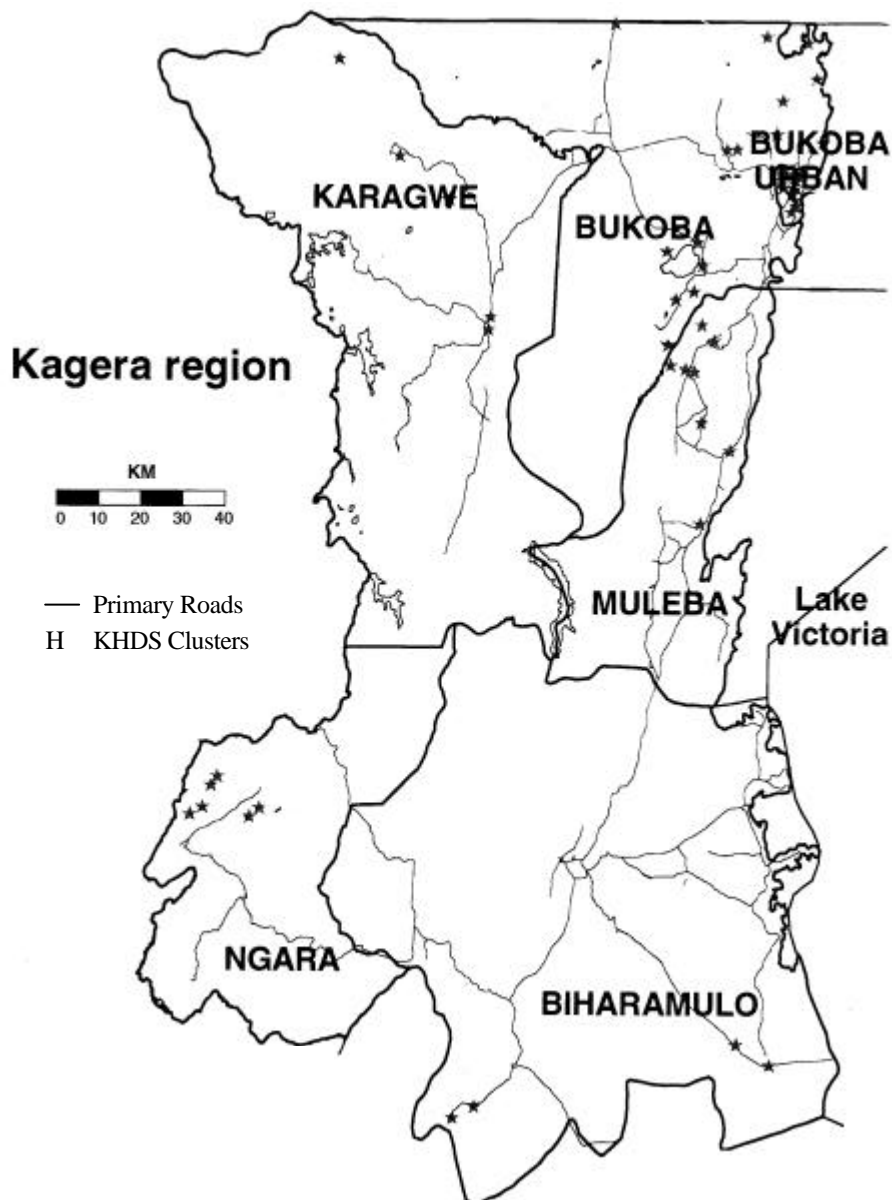
The Kagera Region of northwestern Tanzania is an area especially hard-hit by the AIDS epidemic. Kagera is located on the western shore of Lake Victoria and borders with Uganda to the north and Rwanda and Burundi to the west (Figure 3). Its overwhelmingly rural population of 1.3 million (in 1988) is primarily engaged in the production of bananas and coffee in the north and rain-fed annual crops (maize, sorghum, cotton) in the south. A population-based seroprevalence survey of the region's population in 1987 found that levels of HIV infection among adults ranged from less than 1% in the rural southern part of the region to 10% in the rural north and 24% in the regional capital of Bukoba. In addition to the AIDS epidemic, the region suffered considerably from the 1979 war with Uganda and an infestation of pests and diseases reducing banana output. Relative to the rest of Tanzania, HIV infection rates were higher in Kagera at the time of the survey, orphan rates at least one-third higher than the national average (based on DHS data), and primary and secondary school enrolment rates were below the national average. Within Kagera, the net primary rate fell from 58% in 1978 to 44% in 1988, with essentially no difference by gender (TADREG, 1993).

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<sup>9</sup>The dollar-Tanzanian shilling exchange rate rose from 219 Tsh/\$ in 1991 to 509 Tsh/\$ in 1994. In this paper, we use the 1991 exchange rate of 219 Tsh/\$ because our descriptive statistics are for expenditures in the previous 12 months of household interviewed in late 1991 and early 1992.

<sup>10</sup> Since the early 1990s, the UPE fee has been raised to 2000 Tshs.

**Figure 3: Map of Kagera**



***The dataset***

We use the Kagera Health and Development Survey (KHDS), a longitudinal socioeconomic survey of more than 800 households, conducted in 1991-94 throughout the region (see Ainsworth et al. 1992 and World Bank 1993). The KHDS household sample was stratified based on the agro-climatic features of the region, levels of adult mortality in communities, and indicators of elevated adult illness or mortality. The survey aimed to interview each household four times, at 67-month intervals. Of the 816 households initially selected, a total of 757 completed all four waves of the survey. Households that moved out of the

sample were replaced, so that a total of 915 households were interviewed. The KHDS household questionnaire is based on the World Bank's Living Standards Measurement Survey, modified for a longitudinal research design and to explicitly capture the impact of adult mortality. In addition to collecting detailed measures of household consumption expenditure and income and information on all individuals who died in a recent time period, the survey interviewed each household member to obtain demographic characteristics, survivorship of parents, labour force participation and economic activities, acute and chronic health conditions, school enrolments, migration and fertility. The KHDS also surveyed community leaders and all primary schools in the survey cluster. The questionnaire and research design are described in Ainsworth et al. (1992). The sample for this study is children aged 7-14 from all four waves of interviews, from September 1991 to January 1994. However, since some households dropped out of the survey and some replaced them, for the purposes of comparing the descriptive statistics on children between the first and last interview, we will restrict ourselves to the 1213 children aged 7-14 in the 757 households interviewed four times<sup>11</sup>. We select 7 years of age as the lower bound, since this is the age at which children are legally supposed to enrol in primary school, which lasts seven years. Many children over the age of 14 are still enrolled in primary school because of repetitions and late enrolment. However, many will also be enrolled in secondary school, which in Tanzania involves more restricted access and a different set of policy variables. Therefore, we restrict ourselves to analysis of essentially primary enrolment for children aged 7-14.

We study the impact on current school enrolment of two measures of adult mortality: (1) whether the child is an orphan; and (2) whether any prime-aged adult household member (15-50) has recently died (in the past 6-7 months)<sup>12</sup>. An orphan by definition has lost the person(s) likely to be most concerned with his/her welfare. If other relatives do not get the same satisfaction or long-term benefits from investing in the schooling of a child that is not their own, then orphans (particularly two-parent orphans) may have permanently lower enrolment. The prolonged illness and death of a prime-aged adult can also have an impact on the schooling of other children in the household who are not orphaned. In sub-Saharan Africa, high levels of child 'fostering' result in many children living in households of relatives other than their parents, even when both are alive (Ainsworth 1996)<sup>13</sup>. Often, fostering is linked to schooling decisions;

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<sup>11</sup> Because some of the 757 households interviewed four times never have any children under 15, the total number of households from which the sample of children are drawn is only 553. The descriptive statistics presented here are for the original sample; they have not been weighted to be representative of the Kagera region.

<sup>12</sup> The variable to indicate the past death of a prime-age adult household member applies to the 6 months preceding the first interview in the dataset and then any such death between survey rounds, which were 6-7 months apart.

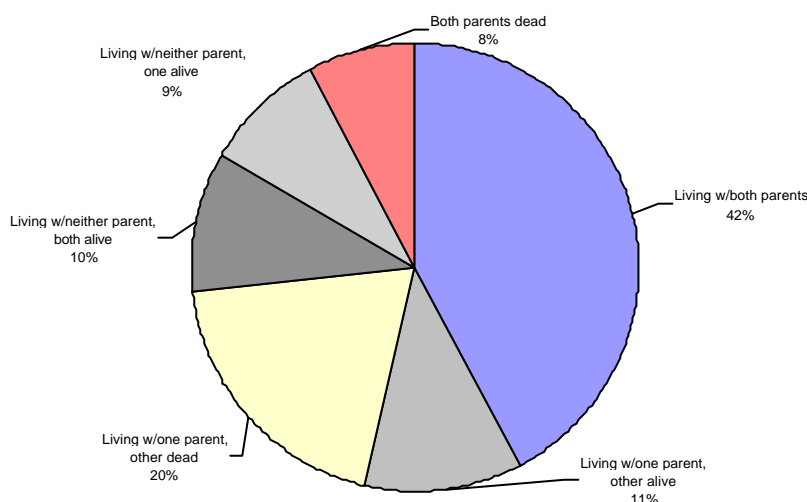
<sup>13</sup> In Tanzania, about 16% of all households had a foster child—a child with one or more living parent who was not living with either of them (authors' calculations, 1996 DHS). In Côte d'Ivoire, one in five children aged 7-14 is living away from two living parents, almost always living with relatives and many residing with grandparents (Ainsworth 1996). A quarter of Ivorian households had a foster child living with them, and 19% had sent a child aged 7-14 to live elsewhere. Lloyd and Blanc (1995) found that 20-51% of children aged 6-14 were living in households headed by someone who was not their parent, in seven African countries.

children can be sent to live with relatives who are closer to schools or have access to better-quality schools (Gould 1985, Saint-Vil 1985). Thus, deaths in the host household have the potential to disrupt the schooling of both their own children and foster children.

### ***Demographic characteristics of the children***

Among the children in the KHDS sample, nearly three-quarters reside with at least one parent, but fewer than half (42%) reside with both parents (Figure 4). Almost one in five children aged 7-14 (19%) does not live with a parent, although one or both are still alive. This reflects a high degree of child fostering. Eight percent of children aged 7-14 were two-parent orphans. Young children are significantly more likely to live with both parents than children aged 11-14 years. By gender and by economic status of the households, we do not see significantly different patterns in living arrangements.

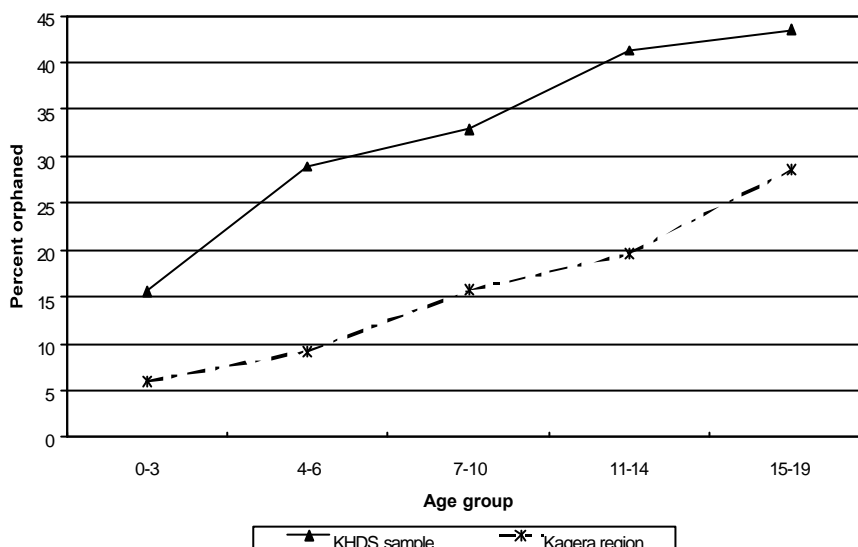
**Figure 4: Distribution of children 7-14 by living arrangement**



Of the children aged 7-14 in the first wave of interviews, 17.2% had lost their father, 11.1% had lost their mother, 7.9% had lost both parents, and 63.6% had two living parents. Paternal orphan rates are substantially higher than maternal orphan rates because fathers are older and therefore have higher mortality. Orphan rates increase with the age of the child and rates for the KHDS sample are more than twice as high as would be observed in a non-stratified random sample (Figure 5). This reflects the sampling strategy of the project to over-sample households at risk of an adult death. Fifteen percent of

children were living in households in which an adult household member aged 15-50 died in the 12 months before the first interview<sup>14</sup>.

**Figure 5: Orphan rates by age group, 1991-92  
KHDS sample and Kagera region compared**



### *Characteristics of the primary schools in the sample*

The KHDS also conducted, in parallel with the household survey, a longitudinal survey of the 62 primary schools serving the 49 communities from which the KHDS sample was drawn (Koda and Ainsworth 1995). The quality of schools across all districts is quite low. At least some schools in every district had crowding problems. More than half of the schools (59%) had fewer blackboards than classrooms. The student/teacher ratio was high everywhere except in the schools in Bukoba Urban district. Mean class size per school in wave 1 was 41. There is a shortage of even the most basic and crucial textbooks (Kiswahili and math): on average, nearly four children must share a single Kiswahili and a single math book. Often, parents must buy the texts: among students aged 7-14, 79% reported some expenditures on books and other school supplies in the 12-month period before the first KHDS interview. Almost all schools reported an annual UPE fee of 200 Tshs (\$0.91) (Koda and Ainsworth 1995). About one in six schools exempted pupils from paying if they were destitute, and one in four if the child was orphaned. The share of schools with exemptions remains surprisingly low, given the severity of the AIDS

<sup>14</sup> Of the 131 adults aged 15-50 who died in the period from 6 months before the first wave until the end of the survey, 46.6% were reported by relatives to have died of HIV/AIDS. Other reported causes of death were: other illness 25.2%; malaria 4.6%,

epidemic in the region. This may be because the fees themselves are relatively low (compared to other school costs, such as uniforms). Among children aged 7-14 enrolled during the first wave of the KHDS, school fees accounted for 3.4% of annual school expenditures per child, and contributions to the school development fund and UPE fund for 16.9%.

#### **IV. The determinants of school enrolments in Kagera**

Among the children in the sample, 58.3% were enrolled in school at the time of the first wave of the KHDS household survey<sup>15</sup>. There was no difference in the enrolment rate for boys and girls, which was consistent with other evidence for primary enrolment in Tanzania (Figure 6). Enrolment rates increased with age up to ages 11-15, when they reached a plateau at about 80%. Thereafter, enrolment rates dropped sharply. On average, children who were currently enrolled spent 23.8 hours in school during the seven days before the interview. The mean number of hours among those enrolled did not differ across children by gender, but increased with the age of the child, from 19.2 hours for children aged 7-10 to 25.8 hours for those aged 11-14.

In Figure 7, we divide children into two groups according to the value of their household's assets per capita<sup>16</sup>: those residing in households with less than the median value of assets per capita (that is, the lower 50%) are labeled as children in 'poor' households, and those with more than the median as 'non-poor'. Children in poor households are less likely to be enrolled than children from non-poor households. Children aged 7-10 living in non-poor households had enrolment rates one-third higher than those living in poor households. This gap persists for older children, with 68% of poor children enrolled compared to 84% of non-poor children. This is consistent with evidence that enrolment rates are positively correlated with expenditure quintiles (World Bank 1999b) but not consistent with the findings of Mason and Khandker (1997), who found no statistically significant correlation between household consumption and enrollment<sup>17</sup>.

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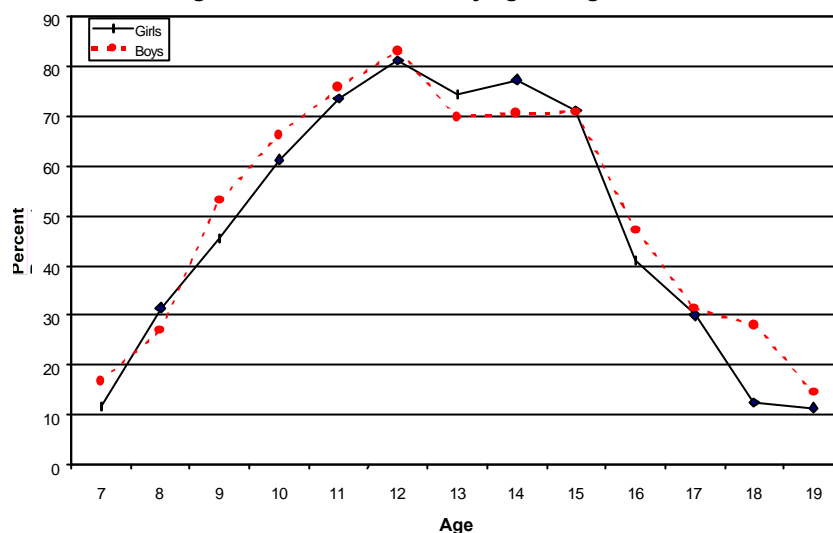
TB/other communicable disease 3.1%, diarrhea 2.3%, accident 0.8%, childbirth 0.8%, witchcraft 3.8%, other cause 1.5% and don't know 9.9%.

<sup>15</sup> Current enrolment includes children who may not have actually attended in the last week (due to school vacation, holiday or illness, for example), but are otherwise considered to be 'in school'.

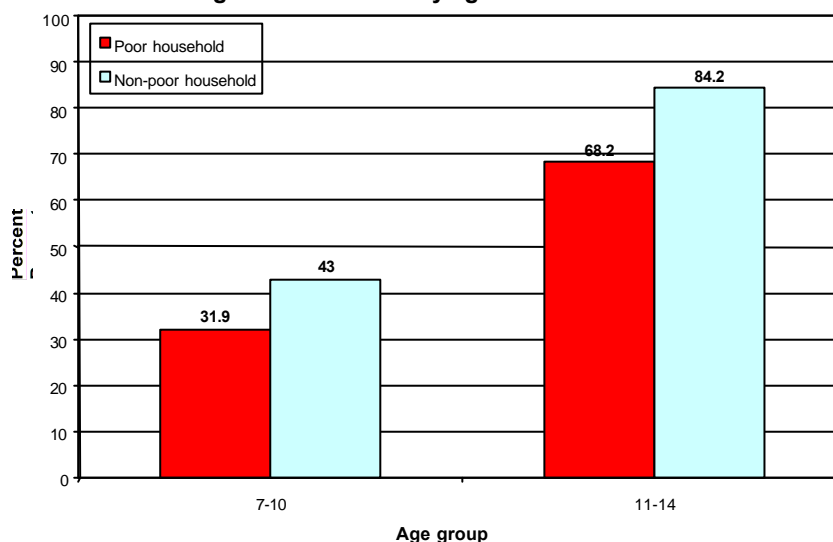
<sup>16</sup> Household assets include the total value of financial and physical stock of all household members (savings, durable goods, land, farm buildings and equipment, livestock, business assets, dwellings, stocks of unsold crops, and business inventory), as valued by respondents.

<sup>17</sup> However, here we use assets (wealth), not household consumption, because the latter was deemed to be more easily influenced by expenditures related to adult deaths.

**Figure 6: Enrolment rates by age and gender**

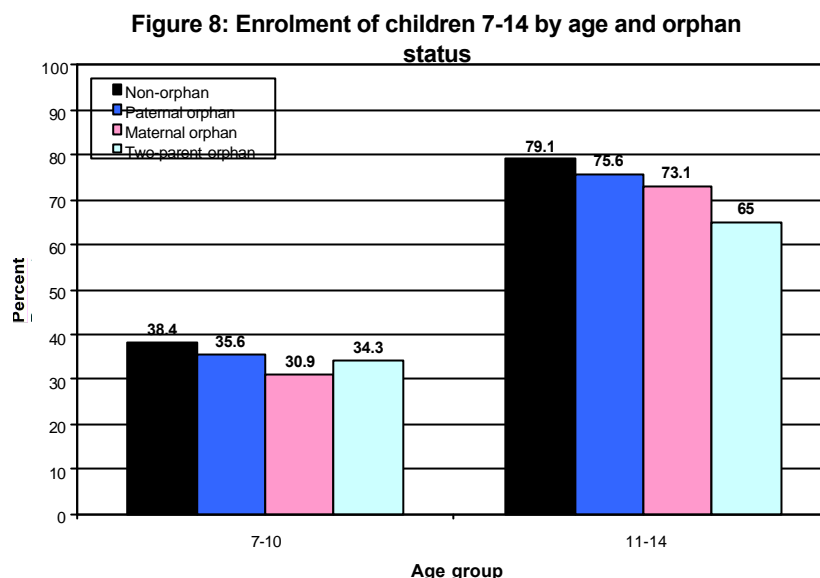


**Figure 7: Enrolment by age and household status**

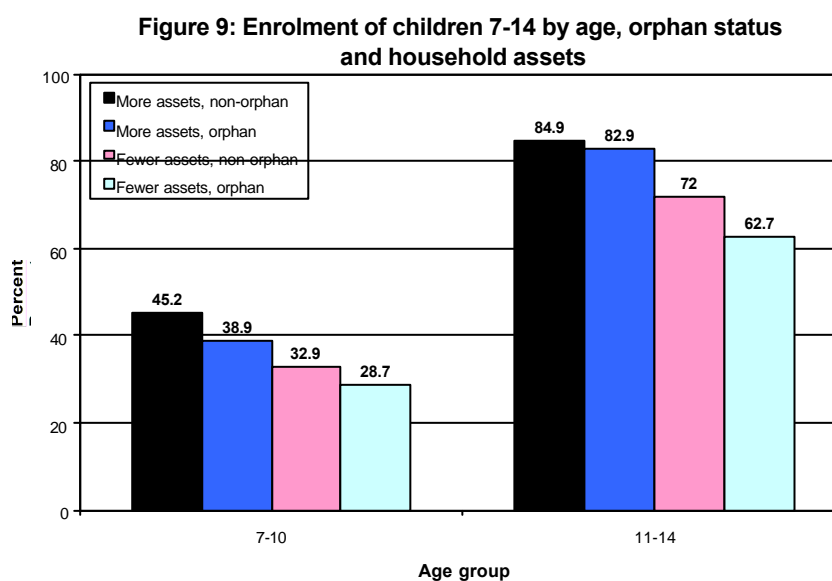


### *The impact of adult mortality on primary enrolment*

Figure 8 shows enrolment rates by orphan status. Fewer than 40% of children aged 7-10 are enrolled. Maternal orphans have the lowest enrolment rate (31%), but there is no statistically significant correlation between orphan status and enrolment in this two-way tabulation. Enrolment rates among the children aged 11-14 are about twice as high, but still less than 80%. Among children aged 11-14, enrolment rates for two-parent orphans (65%) are 14 percentage points lower than for children with living parents (79%). This difference is statistically significant but does not remain in multivariate regression results, when household assets and other individual and household characteristics are controlled for.



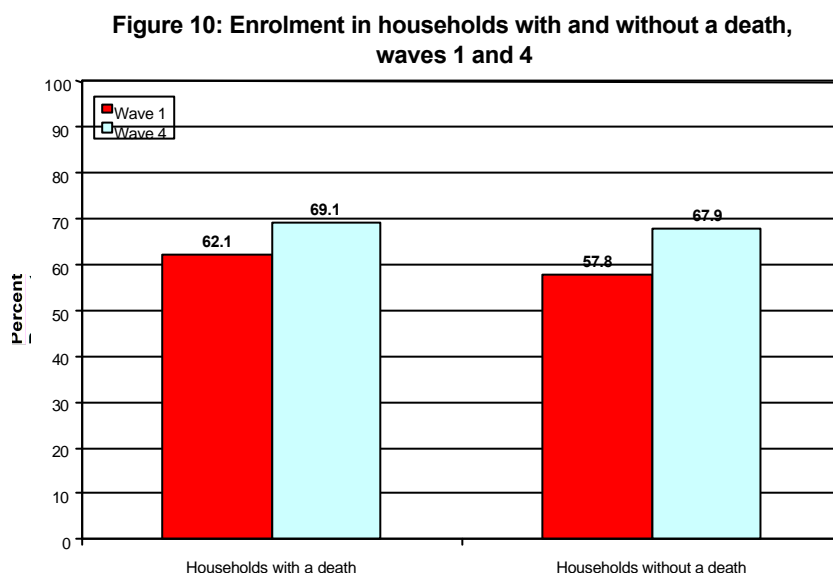
In combining orphan status with a measure of household wealth, we find that the most disadvantaged group is orphans in poor households (Figure 9). Household wealth raises the enrolment rate of orphans, though their enrolment is still lower than that of non-orphans. Orphans in non-poor households have higher enrolment rates than non-orphans in poor households. This pattern is observed among both groups of children, but among children aged 11-14, household wealth seems to almost completely compensate for orphan status, as the enrolment rate for orphans and non-orphans in non-poor households is very similar. Among children aged 11-14 in poor households, there is a much larger gap in enrolment between orphans and non-orphans.



\* Orphan in this figure includes one- and two-parent orphans.



The death of other adult members in the household can also affect enrolment rates. In Figure 10, we compare enrolment rates at the first and last KHDS interview among children in two groups of households—those that experienced a prime-aged death during the KHDS survey and those that did not. The enrolment rate in wave 1 for children in households that eventually experienced a death during the survey is slightly *higher* in the first interview than for children in households with no adult death during the survey (62% vs. 59%, respectively). By the last interview, enrolment rates for both sets of children have increased, by more in the households without an adult death. The increase probably reflects the fact that wave 4 occurred at a slightly different time of the school year. Without accounting for other differences, children in households with an adult death during the panel survey do not have higher dropout rates, or even lower enrolment rates.<sup>18</sup>



Another dimension of adult mortality that may be associated with enrolment is the gender of the deceased. The death of a female adult may have a different impact on enrolment than male deaths for several reasons. First, children may be closer substitutes for female labour in the household, particularly in rural Tanzania where the formal labour market is dominated by men. Second, if women are stronger proponents of schooling for children, then their presence may be an important determinant of enrolment. This is consistent with evidence that the mother's presence (and her own her schooling) is a stronger determinant of child schooling than the presence of the father, found in other studies of Tanzania (Al-Samarrai and Peasgood 1998, Mason and Khandker 1997) as well as other parts of Africa (Tansel 1997,

<sup>18</sup> This result points up one of the confounding factors in analysing the impact of adult deaths when those deaths are not completely exogenous. Most studies that have examined the socioeconomic correlates of HIV infection or AIDS deaths in sub-Saharan Africa have found a *positive* correlation between socioeconomic status and HIV or AIDS death (see the review in World Bank 1999a). For this sample, prime-aged adults who die of AIDS are more likely to be educated and to be in non-farm

Glick and Sahn 2000). Using data only from the first wave of interviews, enrolment rates for children aged 7-10 in households with a female adult death in the previous *12 months* (18%) is *half* the enrolment rate among children experiencing no female deaths (39%), and this result is statistically significant. For older children, the difference in enrolment is small and not statistically significant. The lack of such a gap for older children suggests that the impact of female death is through delayed enrolment into primary school for children aged 7-10 years<sup>19</sup>.

### ***Multivariate analysis***

The analysis of the impact of orphan status and deaths on enrolment is complicated by the fact that households of different economic status are not equally likely to experience a death, nor are they equally likely to enroll their children. In fact, HIV infection in eastern and central Africa appears to be *positively* correlated with socioeconomic status (Ainsworth and Semali 1998; World Bank 1999a). At the same time, adults with higher wealth, more schooling, and employment in more skilled jobs are also more likely to enrol their children. Thus, households that suffer an adult death may be more likely to have enrolled their children before the death. So, even if an adult death lowers enrolment, if we look only at a ‘snap shot’ cross-section of households, those affected by an adult death may appear to have higher enrolment, and it is very difficult to measure the impact of an adult death or of orphan status.

In order to isolate the impact of orphan status and adult death, we need to account for other factors that simultaneously influence the decision to enrol children. In our empirical models, we regress the dependent variable, whether or not a child is currently enrolled in school, on a set of exogenous explanatory variables likely to affect child schooling<sup>20</sup>. The explanatory variables in the regression are chosen to represent the factors affecting enrolment in the economic model in section II:

- *Demographic characteristics*: age, gender, relation to the head of the household (head’s child, head’s grandchild).
- *Characteristics of the household head*: age, gender, years of schooling.
- *Characteristics of the parents*: mother’s schooling, father’s schooling<sup>21</sup>.

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occupations (Ainsworth and Semali 1998). Without the help of panel data, it is extremely difficult to disentangle the negative effects of death in better-off households.

<sup>19</sup> The impact of a female adult death in the past six months, in the multivariate analysis using all waves of data, is not statistically significant, however.

<sup>20</sup> We use a maximum likelihood probit statistical model for enrolment regressions, with robust standard errors to account for the multiple observations of some children.

<sup>21</sup> Parents’ schooling was collected for all children, even if the parents were dead.

- *Household assets*: logarithm of the value of household assets per capita, quality of housing (whether the dwelling had a non-dirt floor).
- *Opportunity cost of the child's time*: hectares of land owned by the household.
- *Adult mortality*: orphan status of the child, whether a prime-aged adult died in the household in the six months before the first interview or between waves of the survey.
- *Availability and quality of schooling*: distance to the nearest secondary school, whether any primary school in the community exempts orphans from paying school fees, the mean number of blackboards per classroom, the mean number of students per math textbook, the mean number of teachers per class.
- *Community variables*: district of residence, urban residence, 1991 adult mortality rate in the community as measured by the KHDS enumeration.

In addition to these explanatory variables, we included numerous interactions to assess whether the impact of different determinants varied according to the orphan status of the child or the event of an adult death<sup>22</sup>. The regressions also controlled for the month of the interview, since enrolment can also be affected by school vacations and seasonal demand for child labour. Over all four waves of the survey, including households seen fewer than four times, we analyse the enrolment decision using 4872 observations on 1743 children<sup>23</sup>. Variable definitions, their means and standard deviations are in Appendix 1. We have analysed the results for the entire sample and for younger (7-10) and older (11-14) children separately.

The determinants of enrollment among younger and older children are quite different and yield insights into parents' or guardians' decisions concerning delayed enrolment and dropping out (Table 1). The results indicate that households cope with adult mortality through delayed enrolment of young children and that they 'protect' the enrolment of other children already enrolled. Maternal orphans aged 7-10 and children in households with an adult death in the past six months have roughly a 10 percentage point lower enrolment rate, compared to children who are not maternal orphans or had no recent adult death. The impact of a recent death depends on the economic status of the household: children in households with low-quality housing (as proxied by a dirt floor) and that had a recent adult death have lower enrolment, while the enrolment of children whose households have better housing is unaffected by

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<sup>22</sup> In different specifications, orphan status was interacted with mother's schooling, father's schooling, grandchild of the head, school availability and quality variables. Adult death was interacted with assets, housing characteristics, and availability and quality of schooling.

<sup>23</sup> Of the 1743 children, 748 were seen four times, 285 were seen three times, 315 were seen twice and 395 were seen once. Children were seen fewer than four times if they turned 7 or 15 during the survey, and if they entered or left the sample. In addition, some households moved away and were replaced by new households, neither of which were seen in all four waves.

an adult death. However, these impacts basically delay enrolment. Neither orphan status nor adult deaths significantly affect the enrolment of children aged 11-14, and this result holds even if we do not control for the household's economic status. There is no evidence that the enrolment of these older children in primary school is permanently affected by orphan status or that they are dropping out following an adult death.

**Table 1. Determinants of primary enrolment: Results of multivariate analysis**

Variable	Children 7-10	Children 11-14	All children 7-14
<b><i>Adult mortality variables</i></b>			
Orphan status (compared to non-orphans)			
Maternal orphan	-	No effect	-
Paternal orphan	No effect	No effect	No effect
Two-parent orphan	No effect	No effect	No effect
Recent adult death (6 months)	- (in HHs with dirt floors)	No effect	- (in HHs with dirt floors)
<b><i>Characteristics of parents and head</i></b>			
Mother's schooling	-	-	-
Father's schooling	No effect	- (only for non-orphans)	No effect
Head's schooling	-	-	-
Child of head	No effect	-	-
Grandchild of head	No effect	-	-
<b><i>Household economic status</i></b>			
Household assets/flooring	-	-	-
Land owned	-	No effect	No effect
<b><i>Community and school variables</i></b>			
Urban area	-	No effect	-
Distance to secondary school	-	-	-
Teachers per primary class	No effect	-	-
Blackboards per classroom	No effect	No effect	-
Students per math book	-	No effect	No effect

Note: - Lowers enrolment; - raises enrolment. The total impact on a two parent orphan is the sum of the impact of maternal orphan, paternal orphan, and two-parent orphan. Maternal orphan status is not statistically significant when controls for assets and housing quality are excluded, nor is adult death for the entire sample. Enrolment rises with age but does not differ by gender (not shown).

The results also highlight key factors that determine whether a child will ever enrol. The mother's schooling (irrespective of whether she is alive) and household assets raise the probability of enrolment of children of all ages. Father's schooling raises enrolment probabilities for older children (11-14), but only if the father is alive, which we interpret to mean that the children of more educated, living fathers are less likely to drop out. For children of all ages, the schooling of the head of the household has a strong positive effect on the probability of enrolment, equal in magnitude to mother's schooling for younger children and twice as large as mother's schooling for older children. Children of the head or grandchildren of the head have no lower probability of enrolling at an early age, but older children who

are the child or grandchild of the head have an enrolment rate about 10% higher than children related in other ways to the head. This is contrary to the stylized fact that children left in their grandparents' care will receive less schooling or may otherwise be disadvantaged. Interactions between the child's orphan status and a grandparent as household head were not statistically significant, indicating that orphans in households headed by a grandparent are no worse off in terms of primary schooling than other children in households headed by a grandparent. There was no correlation between living in a female-headed household and enrolment when the samples are broken down by age group, but when all children are considered as a group, children in female-headed households are (slightly) more likely to enrol than those in male-headed households. Girls are no less likely to enrol than boys, at all ages.

These results for younger children are consistent with the evidence discussed earlier that Tanzanian parents frequently delay their children's enrolment. Since we have controlled for household wealth, we conclude that the reason for delayed enrolment of orphans does not have to do with the ability to pay for the costs of schooling but is an independent effect linked to being an orphan. There is evidence of some of the other reasons cited by parents for delaying enrolment in the results: children (particularly boys) are more likely to have delayed enrolment if the household owns more land. Children in rural areas are more likely to enrol late than children in urban areas; once in school (ages 11-14), neither land ownership nor urban residence affects enrolment decisions. Both of these results attest to the high opportunity cost of children's time and substantiate the report in focus group interviews that parents delay enrolment of young children so that they can help on the family farm (World Bank 1999b). The number of students who have to share a textbook—an indicator of crowding as well as quality—is a significant determinant of the enrolment of young children, but not older children. Crowding is another frequently cited reason for delayed enrolment in Tanzania.

The farther away the nearest secondary school, the less likely boys and girls of all ages are to be enrolled. This may reflect parents' or guardians' assessment of the probability that, having completed primary school, the child will be able to continue. Two indicators of the quality of schooling—the number of blackboards per class and the number of teachers per class—were positively related to enrolment of older children but not younger children. We interpret this as evidence that older children in better-quality schools are less likely to drop out. The crowding and school quality variables have a greater impact on the enrolment of girls than of boys.

The result that the primary schooling of older children does not seem to be affected by adult deaths is in contrast to the widespread (but mostly speculative) literature pointing to school dropouts as a coping mechanism (e.g., Barnett and Blakie 1993, Hunter and Williamson 2000). While this survey took place in the early 1990s, parts of Kagera region were already experiencing a tripling of the adult mortality rate in

some areas, as measured crudely by the 1988 census and the research team's enumeration in 1991. What can account for this unexpected result? We have two main hypotheses.

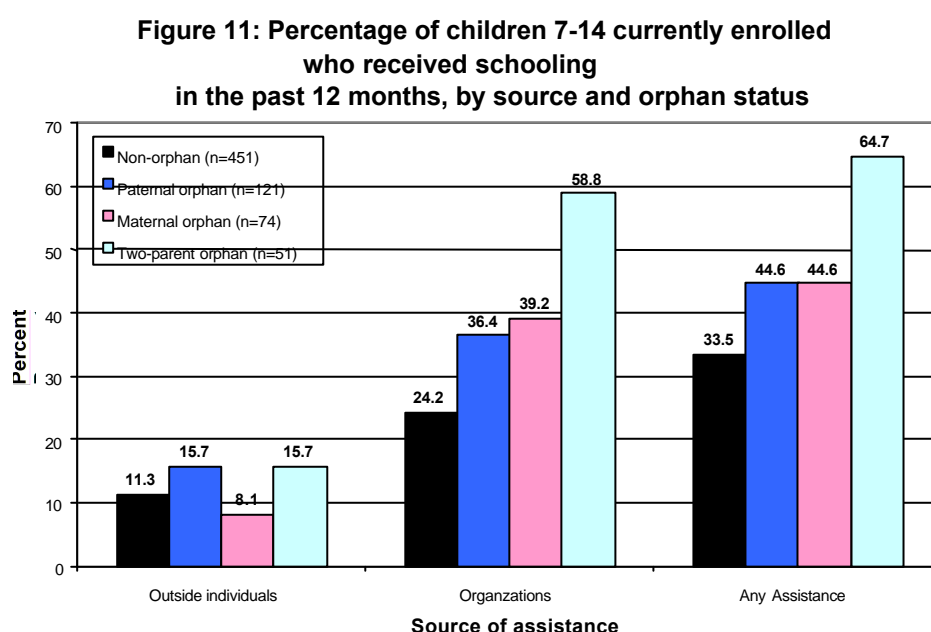
First, adult mortality may have no effect on enrolment of primary students because children aged 7-14 may not play much of a role in coping with the impact of a death. The opportunity costs of the child's time may not be that much greater following an adult death if they are not good substitutes for adults in productive activities, so that there may be no pressure to withdraw from school. Alternatively, primary-school aged children can live at home, perform chores, care for the sick, and go to school; additional time spent on these activities can be taken out of leisure and need not involve dropping out of school, even if the demand for their time increases following an adult death. Results on children's participation rates in coping and economic activities seem to confirm this. Overall, children aged 7-14 had very low participation rates in caring for the sick and mourning (Table 2). About half engaged in farming, housework and collection of firewood, and three-quarters fetched water. However, there are no substantial differences by orphan status. In households with an adult death, however, children's participation in housework rose between the first and last wave (from 51% to 59%) compared with children in households without an adult death (51% to 53%). Breaking this down by age group, the participation rate of *younger* children in housework rose substantially in households with an adult death (from 29% to 44%) while that for older children was much higher but almost unchanged (from 69% to 72%). Participation rates in mourning rose for children in households with an adult death (from 3% to 8%) but stayed the same (4% to 3%) in households without an adult death. Multivariate analysis found that children did not significantly change the number of hours they spent in the activities in Table 2 following an adult death (Beegle 1999). Thus, the evidence suggests very little adjustment *on average* of children's time use following an adult death, except for an increase in housework for children aged 7-10.

**Table 2: Participation rates of children aged 7-14 in market and non-market activities in the past 7 days by orphan status (percent)**

<i>Orphan status</i>	N	Activity					Mourning
		Farming	House-work	Collecting firewood	Fetching water	Caring for sick	
Both living	765	49.5	50.3	45.0	74.3	4.1	3.0
Father dead	205	55.6	52.7	48.3	76.1	2.0	5.4
Mother dead	133	52.6	52.6	39.1	76.7	3.0	3.8
Both dead	95	51.6	50.5	51.6	69.5	5.3	7.4
All children	1198	51.0	51.0	45.4	74.5	3.7	3.8

A second hypothesis is that the older children aged 11-14 are already receiving targeted financial assistance from relatives, government or nongovernmental organizations (NGOs) for the costs of schooling, muting the

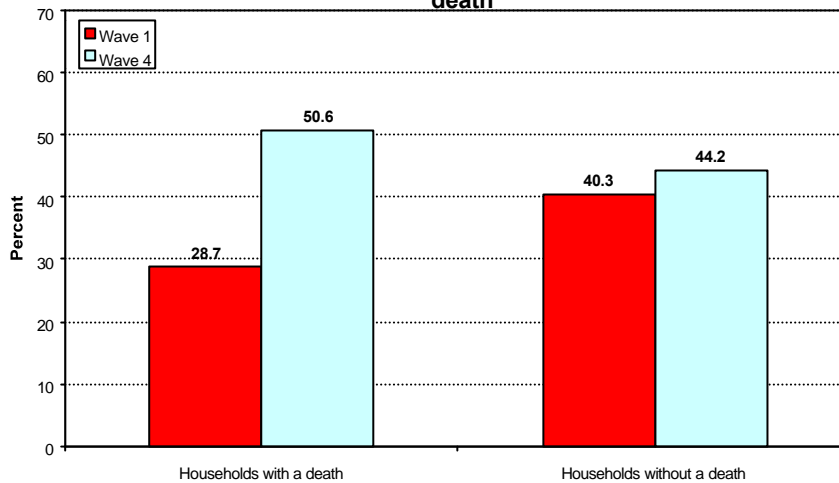
differentials in enrolment between orphans and non-orphans. Among the children in the households visited four times and who were attending school during the first interview, 12.1% received schooling assistance from individuals outside the household, 30.4% received assistance from organizations, and 38.9% received assistance from either source<sup>24</sup>. Schooling assistance from outside organizations was more likely to be received by orphans, especially two-parent orphans, while the share of children who received assistance from individuals outside the household was essentially no different among orphans and children with living parents (Figure 11). This pattern is the same for children aged 7-10 and 11-14, although the older children are slightly more likely to get assistance from organizations than are the younger children. It is no more likely to be targeted to orphans, however. The higher probability of orphans receiving schooling assistance has been confirmed in multiple regression analysis. Indicators for the wealth of the household were generally not associated with receipt of assistance from either source. Furthermore, while children in households that eventually suffered an adult death initially were less likely to receive schooling assistance than children in other households, the percentage receiving schooling assistance by the last wave increased considerably and was higher than in households without an adult death (Figure 12)<sup>25</sup>. This is evidence that children in households with an adult death were also being targeted for schooling assistance, either by relatives or organizations.



<sup>24</sup> On average, schooling assistance from private individuals in the past 12 months was 1073 Tshs (US\$ 4.90) per recipient. Most of the children receiving assistance from an organization (62.3%) received assistance directly from the school. The amount received from schools was small, however—only 270 Tshs (US\$ 1.23) in the prior year. Contributions towards schooling, in cash or in kind, from organizations, amounted to 1,898 Tshs (US\$ 8.67) per recipient.

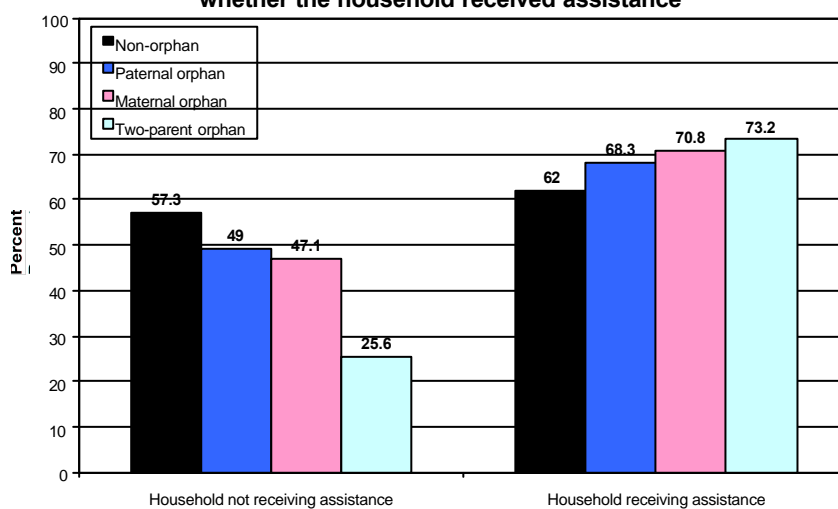
<sup>25</sup> The reference period for assistance in the last wave is 6-7 months (since wave 3), while for the first wave it is the past 12 months.

**Figure 12: Percent of children receiving schooling assistance among children enrolled, households with and without a death**



In addition to direct assistance for schooling, about 40% of children aged 7-14 were living in households that received outside assistance from government or NGOs in the 12 months prior to wave 1. Children living in these households were more likely to be enrolled than children in households not receiving assistance (Figure 13). In households receiving assistance, orphans were in fact equally if not more likely to be enrolled than children with two living parents. In households not receiving assistance, orphans were less likely to be enrolled than children with living parents. Note, however, that assistance to the household is not the only determining factor in school enrolments, since even in households receiving assistance, fewer than three-quarters of children are enrolled.

**Figure 13: Enrolment rates by orphan status according to whether the household received assistance**





## V. Conclusion

As adult mortality rates rise due to AIDS, there is increasing concern over the fate of orphans. In this study, we explore one dimension of this impact—their schooling. Schooling is an important investment in children's future productivity and well-being. However, the schooling of orphans and other children in homes with an adult death is threatened because families affected by an adult death may be less able to afford direct and indirect costs of schooling, and the child's opportunity cost of time may rise in household and farm activities. In this paper, we assess whether orphans or children in households with an adult death are less likely to be enrolled in primary school. The data come from the Kagera region of Tanzania, which, at the time of the study, was the part of Tanzania hardest-hit by the AIDS epidemic, with adult mortality rates three times higher than would be expected in the absence of AIDS. We draw on a sample of children aged 7-14—the main years for primary school enrolment. These data provide some key advantages to address this issue, including a relatively large sample of orphans, detailed information on primary schools, and multiple observations on households and children allowing us to examine enrolment *before and after* an adult death occurs in the household. Moreover, these data allow us to compare a representative sample of orphans with a representative sample of non-orphans.

We find that Tanzanian households are coping with adult deaths by delaying enrolment of young children (7-10), while maintaining enrolment of older children (11-14). Among orphans, only maternal orphans are being held back. The practice of delaying enrolment of primary-aged children is already the norm in Tanzania; studies have found that over 80% of primary-aged children have delayed enrolment. The reasons why schooling is delayed are well known, having to do with the opportunity costs of the children's time, overcrowding in schools, low returns to primary schooling, and limited opportunities for secondary schooling. Multivariate results found that these same factors are affecting enrolment decisions in our sample. However, controlling for these factors and for household wealth, we find that maternal orphan status and adult deaths have a separate and *independent* effect on delayed schooling of the youngest children. We find no evidence that older orphans (11-14) or older children in households with an adult death drop out of primary school. Nevertheless, the lack of correlation between orphan status and enrolment for older children is consistent with other research for Tanzanian children aged 10-14 nationwide, based on DHS data (Lloyd and Blanc 1995). Children and orphans in households headed by grandparents are as likely to be enrolled as children of the head of a household, and more likely to be enrolled than children in households headed by relatives other than the parent or grandparent. Thus, the concern that Tanzanian children's schooling may be sacrificed if they are raised by grandparents seems to be unfounded, at least with respect to primary schooling.

We have suggested several explanations for these findings. First, household coping mechanisms may buffer any long-run impact on enrolment. Extended families and support networks may be effectively fostering-in children or transferring resources such that children do not need to be withdrawn from school when a death occurs. Second, the opportunity cost of time of the children in school may be less than anticipated. We find an increase in participation rates in housework only, and only for the youngest children, consistent with their delayed enrolment. The participation rates of children aged 11-14 in most activities are unaffected by either orphan status or an adult death. These results are for primary schooling only; the impact of adult deaths on secondary enrolment, which is very much constrained in Tanzania, has yet to be studied. Further, children in secondary school are much older and the opportunity cost of their time greater in the event of an adult death. Third, targeted assistance from organizations to orphans and households with a death may help keep children in school. Among the children currently enrolled, we do find that orphans were significantly more likely to be receiving assistance from organizations (but not from individuals) for schooling costs. However, many orphans do not get assistance and many children who are not orphans do receive assistance. Assistance also seems to be targeted towards households with an adult death, although not exclusively. Disentangling the role of school assistance in enrolment is on the agenda for future research.

Primary schooling in Tanzania is low and has been in *decline* for many years, even before the AIDS epidemic. Nearly half of the children of primary school age are not enrolled, making this one of the lowest primary enrolment rates in sub-Saharan Africa. Since most children will only receive primary school education, parents and guardians typically enrol them late—a situation exacerbated by crowding and low-quality school facilities. However, most children do eventually enrol; those who do not are generally the poorest children. Our study has shown important factors that are likely to reduce delayed enrolment and dropout rates at the primary level: better access to secondary schooling, reduced crowding of classes, better quality of physical facilities (such as blackboards), and a higher teacher-class ratio. In terms of targeted programmes for the schooling of orphans and children in households with an adult death, we have shown that AIDS mortality happens to both poor and non-poor households, and that those in non-poor households are already in a position to cope. Thus, programmes linked to the impact of adult mortality must be careful to target children in the poorest households. However, given the low investment in and quality of primary schooling in Tanzania, an important question for policy to address is the relative costs and impact of raising enrolments via targeted transfers to orphans, compared to improvements in school quality and better access to secondary schooling. The latter strategy would not only raise enrolments but also raise the returns to schooling by improving its quality for all children, including orphans. It could, conceivably, have a greater impact on the welfare of orphans than targeted transfers or subsidies to attend low-quality, crowded schools with limited opportunities for secondary schooling. The

results are also an important reminder to resist the temptation to search for a single policy solution for all countries. Sub-Saharan countries each start with a different level, quality and history of school enrolment issues that may make the optimal response to the impact of AIDS on child schooling very specific to the country in question.

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Appendix 1: Variable means and standard deviation for the multivariate regressions<sup>a</sup>

Variable	Mean	SD
Currently enrolled in school*	0.657	0.475
Age 8-11*	0.466	0.499
Age 12-14*	0.418	0.493
Female*	0.488	0.500
Child of household head*	0.662	0.473
Grandchild is household head	0.173	0.378
Mother dead*	0.206	0.404
Father dead*	0.273	0.445
Both parent's dead*	0.088	0.283
Father's education (years)	5.370	3.104
Mother's education (years)	3.822	2.985
Age of household head	49.947	14.881
Female household head*	0.265	0.441
Education of household head (years)	4.264	3.086
Flooring is non-earth*	0.163	0.369
Acres of land owned	4.944	4.939
Logarithm of the value of household assets per person	11.228	1.320
Any male adult death in past 6 months*	0.017	0.128
Karagwe district, rural*	0.085	0.279
Muleba district, rural*	0.139	0.346
Biharamulo district, rural*	0.076	0.265
Ngara district, rural*	0.112	0.315
Urban community*	0.245	0.430
Community adult morality rate, per 1000	15.696	8.071
Distance to secondary school in km	17.485	20.082
Average teachers per class in primary schools	1.339	0.451
Average students per math text in primary schools	3.760	5.155
Average blackboards per classroom in primary schools	0.807	0.217
Any adult death in past 6 months	0.044	0.206
Any female adult death in past 6 months	0.029	0.168

\* Dichotomous variable (=1 if condition is met, otherwise = 0)

<sup>a</sup> Controls were also introduced for months of the interview, but are not shown here to conserve space.